WHAT IS CLAIMED IS:

1. An integrated circuit incorporating an Electrostatic Discharge (ESD) protection device comprising:

a semiconductor substrate;

an electrical contact pad;

an ESD switch coupled to the pad and having an active device region formed in the semiconductor substrate; and

a thermal energy absorbing region formed in the semiconductor substrate in thermal contact with said active device region made from a material substantially more resistant to thermo-mechanical expansion than said active device region.

2. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 1, wherein said material substantially more resistant to thermo-mechanical expansion has a thermal expansion coefficient lower than approximately $5 \times 10^{-6}$ °$K^{-1}$.

3. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 1, wherein said material substantially more resistant to thermo-mechanical expansion has a melting temperature higher than approximately 2000 °K.

4. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 1, wherein said material substantially more resistant to thermo-mechanical expansion has a tensile strength higher than approximately 300 MPa (Mega Pascals).

5. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 1, wherein said material

substantially more resistant to thermo-mechanical expansion has a fracture toughness approximately higher than about 1.0 MPa $m^{1/2}$.

6. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 1, wherein the ESD switch is a transistor.

7. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 1, wherein said thermo-mechanical absorbing region is in direct contact with said active device region.

8. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 6, wherein the transistor is a MOSFET structure and wherein the active device region comprises:

a source region;

a drain region; and

a channel region between the source region and the drain region.

9. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 1, wherein the ESD switch is a diode.

10. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 1, wherein said material substantially more resistant to thermo-mechanical expansion than the active device region is selected from the group consisting of diamond, boron nitride, silicon carbide or carbon.

11. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 1, wherein the ESD switch includes a resistor or a capacitor.

12. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device comprising:

a semiconductor substrate;

an electrical contact pad;

a plurality of active devices formed on the substrate;

a first connector formed of a first electrically conductive material connecting the plurality of active devices; and

an ESD switch coupled to the pad, at least in part via a second connector, said ESD switch having an active device region in the semiconductor substrate, and wherein said active device region has a length, said second connector electrically connected to the ESD switch comprising material more resistant to thermo-mechanical expansion than said first connector formed of said first electrical conductive material wherein the second connector extends away from the substrate a distance at least equal to one-half of the length of the active device region.

13. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 12, wherein said material substantially more resistant to thermo-mechanical expansion has a thermal expansion coefficient lower than approximately $10 \times 10^{-6}$ °$K^{-1}$.

14. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 12, wherein said material substantially more resistant to thermo-mechanical expansion has a melting temperature higher than approximately 1500 °K.

15. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 12, wherein said material substantially more resistant to thermo-mechanical expansion has a tensile strength higher than approximately 200 MPa (Mega Pascals).

16. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 12, wherein said material substantially more resistant to thermo-mechanical expansion has a fracture toughness approximately higher than 1.0 MPa $m^{1/2}$.

17. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 12, wherein the ESD switch is a MOSFET transistor and the active device region comprises:

a source region;

a drain region; and

a channel region between the source region and the drain region.

18. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 12, wherein said material resistant to thermo-mechanical expansion is composed primarily of titanium nitride (TiN).

19. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 12, wherein said material resistant to thermo-mechanical expansion is composed primarily of carbon (C).

20. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 12, wherein said material resistant to thermo-mechanical expansion is composed primarily of an alloy of aluminum (Al) and TiN.

21. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 17, wherein the first connector is composed of Al, Cu or an alloy of Al and Cu.

22. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device comprising:

a semiconductor substrate;

an electrical contact pad;

a connector electrically connected to the electrical contact pad; and

an ESD switch coupled to the pad, at least in part via the connector, said ESD switch having an active device region in the semiconductor substrate, and wherein said semiconductor substrate comprises a thermo-mechanical energy sink fabricated from material resistant to thermo-mechanical expansion, the material having physical properties including a low thermal expansion coefficient lower than approximately $5 \times 10^{-6}$ $°K^{-1}$.

23. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 22, wherein the material resistant to thermo-mechanical expansion has physical properties further including a high melting temperature approximately higher than 2000 °K.

24. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 22, wherein the material resistant to thermo-mechanical expansion has physical properties further including a high fracture toughness higher than about 1.0 MPa $m^{1/2}$.

25. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 22, wherein the material resistant to thermo-mechanical expansion has physical properties further including a high tensile strength approximately higher than 300 MPa.

26. The integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 22, further comprising a grounded back contact electrically coupled to the semiconductor substrate, so that when an ESD event occurs producing an ESD current, the current is shunted from the ESD protection device through thermo-mechanical energy sink and through the grounded back contact.

27. An integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 22, wherein said active device region comprises said thermo-mechanical energy sink.

28. An integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 22, wherein said semiconductor substrate is fabricated from said material resistant to thermo-mechanical stress.

29. An integrated circuit incorporating an Electrostatic Discharge (ESD) protection device according to claim 22, wherein said material resistant to thermo-mechanical expansion is selected from a group consisting of diamond, hard carbon or boron nitride.

30. An integrated circuit, comprising:

a semiconductor substrate;

a core circuit comprising a plurality of devices having electrical connectors and active device regions formed in the semiconductor substrate and one or more electrical insulator regions; and

an ESD circuit comprising an active device having an active device region formed in a substrate material, one or more electrical connectors, and one or more electrical insulator regions, and one or more passive components wherein at least one of said substrate material, electrical connectors, active

device region, passive circuit components or electrical insulator is composed in whole or in part of a material substantially more resistant to thermo-mechanical damage than the corresponding structure in said core circuit devices.

31. The integrated circuit of claim 30, wherein the passive component comprises a resistor or a capacitor.

32. The integrated circuit of claim 30, wherein the ESD switch is spaced apart from the core circuitry by at least 10 microns.

33. The integrated circuit of claim 30, wherein said material substantially more resistant to the thermo-mechanical damage comprises a material having a substantially lower coefficient of thermal expansion.

34. The integrated circuit of claim 30, wherein at least one of the said electrical connectors of the ESD circuit comprises carbon.

35. An integrated circuit, comprising:

a semiconductor substrate;

a core circuit comprising a plurality of devices having electrical connectors and active device regions formed in the semiconductor substrate and one or more electrical insulator regions; and

an ESD switch having means, integrated with the switch structure, for preventing thermo-mechanical damage due to an ESD event.

36. A method of fabricating an ESD device on a semiconductor substrate, the method comprising:

fabricating an ESD switch from one or more connectors and one or more active device regions formed in the semiconductor substrate;

providing a region composed of a material resistant to thermo-mechanical expansion, the region in thermal contact with said switch, wherein the material has physical properties including a low thermal expansion coefficient lower than approximately $5 \times 10^{-6}$ °$K^{-1}$.

37. The method of claim 36, wherein the material has physical properties further including a high melting temperature higher than approximately 2000 °K.

38. The method of claim 36, wherein the material has physical properties further including a high tensile strength higher than approximately 300 MPa (Mega Pascals).

39. The method of claim 36, wherein the material has physical properties further including a high fracture toughness higher than approximately 1.0 MPa $m^{1/2}$.